GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC SEMESTER V– EXAMINATION – SUMMER 2017

Subject Code:X51101   **Date: 29/04/2017**
Subject Name: Antenna & Wave Propagation
Time: 02.30PM to 05.00PM   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Derive the fundamental equation for filed strength at the receiving antenna for free space conditions.	**07**
	(b)	Solve the followings:	**07**
		1) If the electric field of a plane wave is 2 V/m, what is the strength of a magnetic field H in the free space?	
		2) A short vertical grounded antenna is design to radiate at 10 Mhz. Calculate the radiation resistance, if the effective height of antenna is 60 meters.	
Q.2	**(a)**	Define the following terms:	**07**
		1) Radiation Intensity	
		2) Gain	
		3) First Null Beam width	
		4) Effective Aperture	
		5) Polarization	
		6) Effective length of Antenna	
		7) Fading	
	(b)	Derive the expression of radiation resistance in half wave dipole antenna.	**07**
		OR	
	(b)	What is antenna array? Obtain the expression for the resultant field due to two isotropic point sources placed at a distance 'd' and fed with the same amplitude of currents but with a phase of 'α'. Sketch the radiation pattern for the spacing of d=λ/2 and phase α=180º.	**07**
Q.3	**(a)**	Obtain the expressions of electric and magnetic fields of an oscillating dipole.	**07**
	(b)	Discuss the use of Dolph-Tchebysheff distribution and polynomials in detail for antenna array design.	**07**
		OR	
Q.3	**(a)**	Draw the figure of helix with its associated dimensions showing the relation -ship between the circumference, spacing, turn length and pitch angle of helix. State the limits of C_λ , α and n for a helix to produce an axial mode.	**07**
	(b)	Explain the principle of pattern multiplication for array of point sources.	**07**
Q.4	**(a)**	Explain the Babinet's principle for slot antenna.	**07**
	(b)	Write a brief note on Yagi Uda antenna.	**07**
		OR	
Q.4	**(a)**	Classify the various type of horn antenna. How does the corrugation help the overall performance of the horn antennas?	**07**
	(b)	Write brief note on Microstrip patch antenna with its advantages and limitations.	**07**

Q.5 **(a)** Write a short note on: **07**
    1)   Reflector antenna
    2)   Log periodic antenna.

    (b) Explain Gain measurement and impedance measurement of antenna along with **07**
    the experimental set-up.

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OR

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Q.5 **(a)** What are the different modes of propagation? Explain the followings: **07**
    1)   Critical Frequency
    2)   MUF.

    (b) Solve the followings. **07**
    1) Find the basic path loss for a communication from moon to the earth operating at 3000 MHz. Assume distance between moon and earth is 384000 Km.
    2) Find field strength at a distance of 10 km from a 100 kW, Medium wave broadcast transmitter employing a short vertical antenna, assuming that the field strength value is 300 mV/m at a distance of 1 km from the transmitter for a radiated power of 1 kW.

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